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Fish Stocking Assessment of Dina Lake #2, 2002

R. J. Zemlak and D. M. Cowie
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The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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DINA LAKE #2

WATERSHED:	Parsnip River
DATE OF SURVEY:	June 17- 20, 2002
FIELD CREW LEADER:	Randy J. Zemlak
FIELD ASSISSTANT:	Arne R. Langston

PEACE/WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

B.C. HYDRO
GENERATION

and

MINISTRY OF WATER, LAND and AIR PROTECTION
ENVIRONMENTAL STEWARDSHIP DIVISION

REPORT PREPARED BY: Randy J. Zemlak
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INTRODUCTION

Dina Lake #2 is located 25 km north northwest of Mackenzie BC (Table 1, Figure 1). The lake has received significant attention since 1970 from fish biologists with both the Ministry of Water, Land and Air Protection (MWLAP) and the Peace/Williston Fish and Wildlife Compensation Program (PWFWCP). A standard fisheries baseline reconnaissance level survey of Dina Lake #2 was conducted by the Fish and Wildlife Branch (Prince George) in June 1970 and 1977 (data sheets on file at MWLAP in Prince George, B.C.). In June 1991, the lake was surveyed by PWFWCP fish biologists to identify potential fisheries enhancement projects and to determine if changes to the stocking program were required (McLean et al. 1991). BC Environment developed a Fisheries Management Plan in February 1992 for the Dina Lakes chain (Jesson 1992). All of the above reports can be viewed at the PWFWCP office (address on cover page).

During June 2002, PWFWCP fish biologists investigated Dina Lake #2 primarily to evaluate the success of the current fish stocking program. Future stocking recommendations from this evaluation will be passed on to the MWLAP for their approval/implementation.

Table 1. Dina Lake #2 lake information.

Location:	25 km north northwest of Mackenzie BC
Elevation:	± 716m
Latitude/Longitude:	55° 32' 12" : 123° 17' 36"
U.T.M.:	10.4715.61544 (NAD 1983)
Management Unit:	7-30
N.T.S. Map No.:	93 - O/11
Watershed:	Parsnip River
Waterbody Identifier:	00346PARA
Lake Drainage:	Unnamed outlet creek to Dina Lake # 1

ACCESS

Although access to Dina Lake #2 has not changed significantly since the original reconnaissance level lake inventory (1991), exact road directions and conditions have changed over time. From the Alexander Mackenzie Hotel in Mackenzie (0.0 km), drive north on the Mackenzie Boulevard/Finlay Forks Forest Service Road. At 0.4 km, drive straight through the 4 way intersection. At 7.5 km, the road changes from a two lane paved road to a two lane gravel (2wd) road. At 8.4 km, cross Morfee Creek bridge. At 9.5 km, go straight through a four way intersection on the Parsnip West Forest Service Road. At 10.4 km, stay right at the 3-way intersection. Continue on to km 30.4 and turn right at Dina Lake #2. There is a short trail on a steep bank that provides access to the lake.

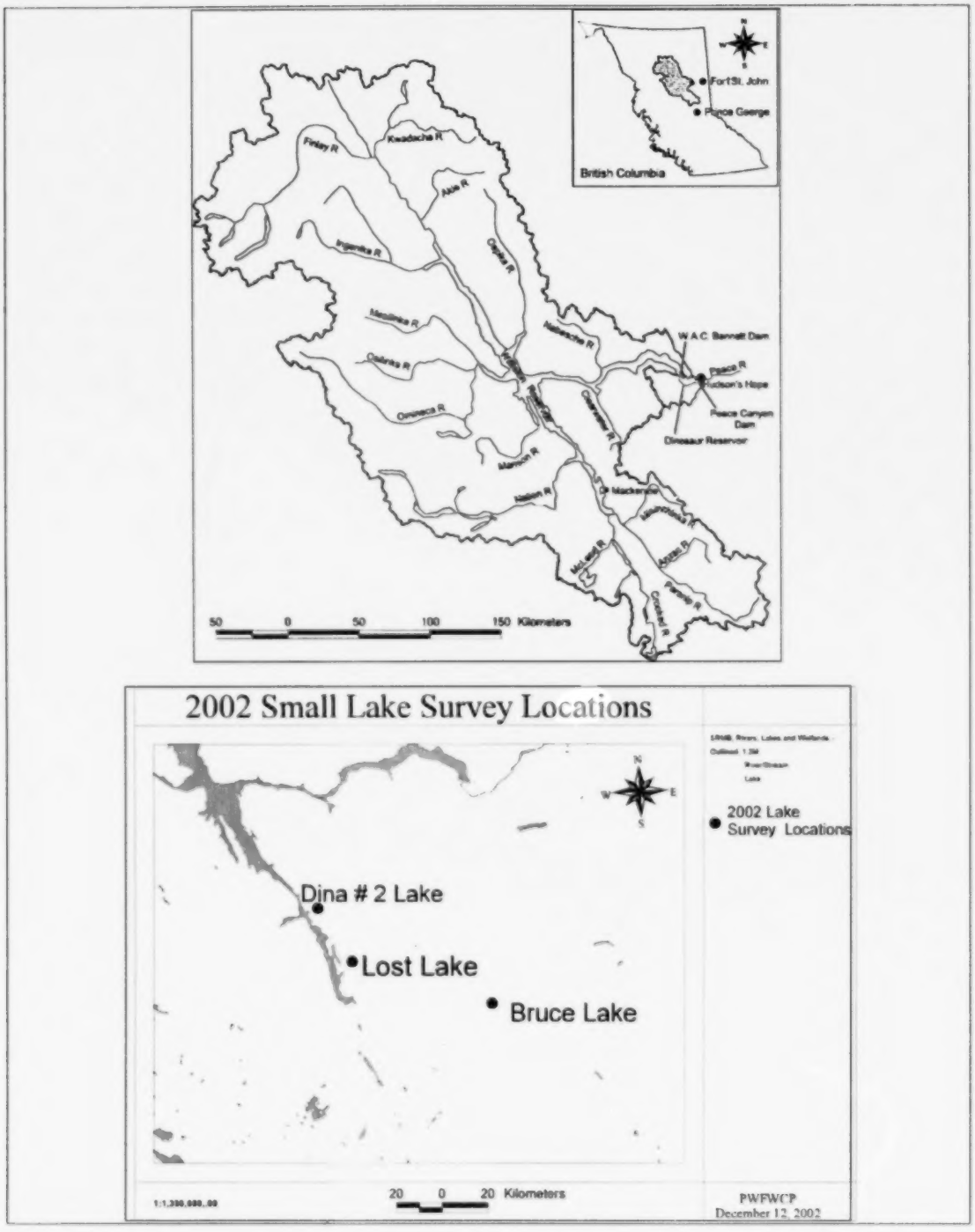

Figure 1. Location of Dina Lake #2.

STOCKING HISTORY

Dina Lake #2 was initially stocked with 10,000 brook trout in 1984 (Table 2). Brook trout are not native to the Williston Watershed. According to the Release Records Database (MWLAP), brook trout are the only introduced fish species stocked. Initially, these brook trout were viable fish but then the stock changed to sterile fish in 1998. This change in stock was a conservation measure to protect the natural fish and reduce any possible chances of cross breeding with other species (i.e. bull trout from other systems). Currently, the lake receives 10,000 brook trout annually.

Table 2. Dina Lake #2 Brook trout stocking history.

Year	Species	Number	Size (g)	Life Stage	Stock
1984	EB	10 000	3.9	Unknown	Aylmer
1987	EB	5 000	1.9	Fingerling	Aylmer
1988	EB	5 000	2.7	Unknown	Aylmer
1989	EB	10 000	2.5	Fry	Aylmer
1990	EB	5 000	4.2	Fingerling	Aylmer
1992	EB	10 000	2.4	Fingerling	Aylmer
1993	EB	10 000	3.4	Fingerling	Aylmer
1994	EB	10 000	3.9	Fingerling	Aylmer
1995	EB	10 000	3.8	Fingerling	Aylmer
1996	EB	10 000	3.9	Fingerling	Aylmer
1997	EB	7 000	3.3	Fingerling	Aylmer
1998	EB	10 000	4.4	Fingerling	Aylmer 3N
1999	EB	10 000	5.9	Fingerling	Aylmer AF 3N
2000	EB	10 000	4.8	Fingerling	Aylmer AF 3N
2001	EB	10 000	6.6	Fingerling	Aylmer AF 3N

METHODS

Four different techniques were used to determine relative abundance of fish species in Dina Lake #2. Conversations with MWLAP fish biologists prior to the gill netting effort suggested that it would be valuable to have at least 10 fish sampled from each age group to accurately provide future recommendations to the stocking program. Therefore, about 30 to 40 fish were required.

The first method used to capture fish was a trap net. Our goal was to try and capture as many brook trout as possible without harming them. The live trap was made of fine net mesh (3.175 mm stretch) and was set in shallow water facing southeast towards the outlet (Figure 2). The trap was 4.1 m long with mouth dimensions of 0.9 by 0.9 m. The trap had two 6.1 m long side-wings and a 30.5 m centre wing wall. This trap net (box end) was set in 3.2 m of water. The mouth entrance was in slightly deeper water (3.6 m), and the end of the 100' lead line was at 6.5 m.

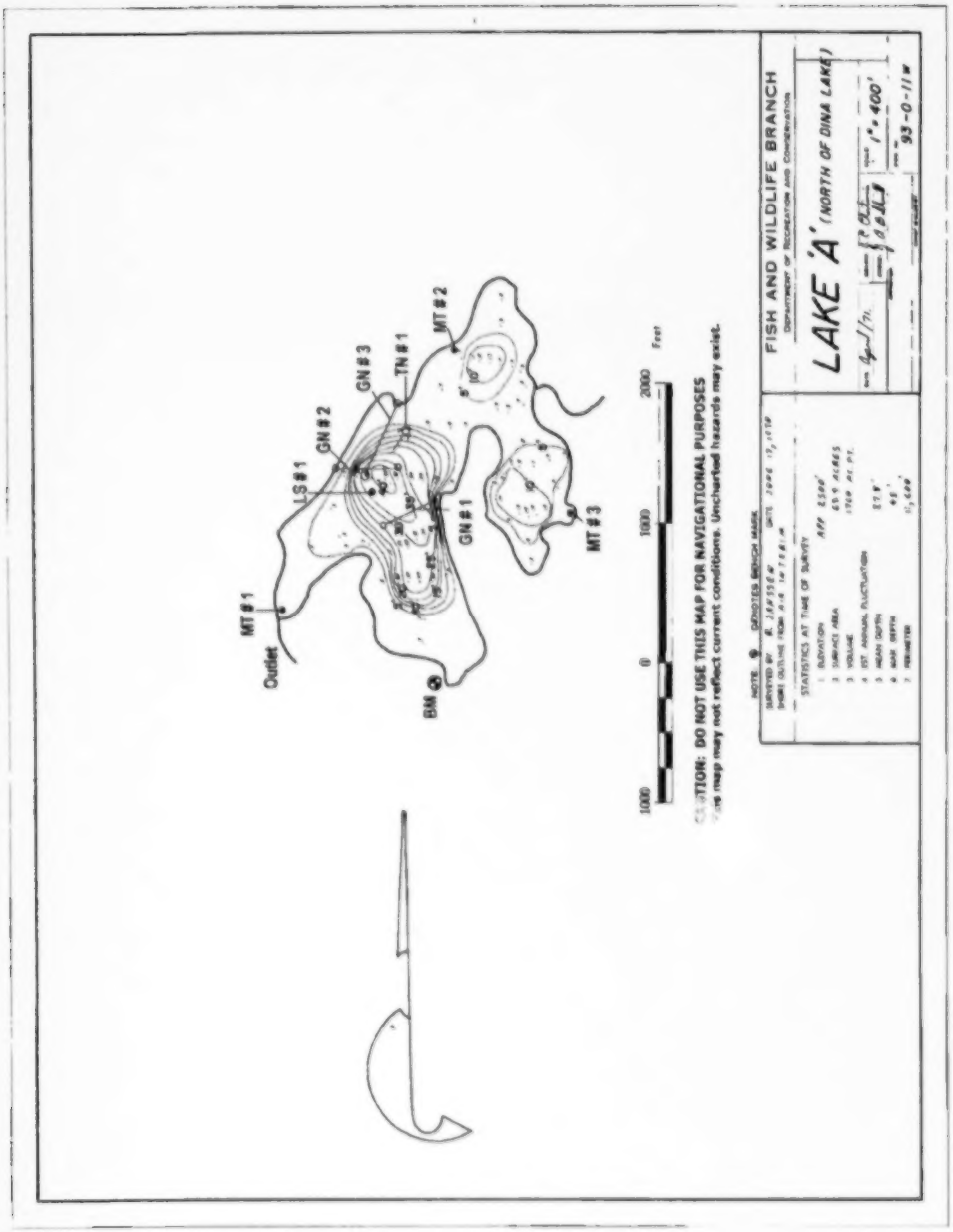

Figure 2. Location of gill net sets and minnow trap locations on Dina Lake #2.

Two different gill nets were also used in Dina #2 (Figure 2). One sinking monofilament experimental gill net was used for two sets (one daytime and one overnight). The net consisted of six different sized stretch mesh panels ranging from 25 to 85 mm. Each panel is 15.24 m long and 2.4 m wide. The second net used was a floating experimental monofilament gill net. This net had the same number of panels and measurements as the sinking net.

The third method used was Gee traps. Each Gee trap (three in total) was baited with either cat food or sardines. The traps were set for two nights in shallow (< 2 m) littoral habitat. The intent of these traps was to try and capture juvenile sized fish that are too small to be captured by the gill nets.

The fourth technique used to capture fish was angling gear. A spin cast rod with an assortment of lures and a fly rod with dry flies were utilised. Angling efforts by PWFWCP fish biologists were also recorded to determine additional catch per unit effort. Any anglers encountered were interviewed to determine their catch per unit effort.

The brook and rainbow trout captured were measured for fork length and weight. A biological examination was conducted on fish caught to reveal sex, maturity, stomach contents, and disease/parasite presence. Scale samples were collected for age determination and analysis was performed by North/South Consultants (Winnipeg, Manitoba). General appearance of the fish was determined through visual analysis. Photos of fish were taken but are not presented in this report.

Mean lengths and weights were determined for each age class. Condition factors ($\text{Weight(g)/Length(cm)}^3 \times 100$) were determined for each individual fish and for each age class. Growth comparison were made between the two latest sample years (1991 and 2002). All other fish species were enumerated and the general appearance of these fish were observed and recorded. In addition, their minimum, mean, and maximum lengths were also recorded by species. Any non-game fish captured that were still alive in the gill nets were released immediately.

The habitat features of Dina Lake #2 were briefly assessed. The entire perimeter of the lake was observed to confirm presence/absence of inlet and outlet streams. The benchmark set during the original study (1970) was located. Changes to the current water level was measured with an Abney level, 1.5 m staff, and a 30 m Eslon tape. Any new campsites and other developments identified after the original survey were also recorded. Photo documentation was also taken of the lake habitat but is not presented in this report.

A limnology station was established to profile the water temperature and dissolved oxygen at varying depths. The deepest part of the lake was identified for this work with the aid of a bathymetric map and a depth sounder. A YSI model 58 oxygen/temperature meter was used to measure these conditions for the limnological profile. Oxygen and temperature were recorded from the surface to the bottom at 1 meter intervals. Time and weather conditions were also recorded.

RESULTS

Of the four methods used to evaluate the stocked fish population in Dina Lake #2 (Table 3), gill netting proved to be the most effective method that produced brook trout (20). Angling gear and the trap net only captured one brook trout each while the Gee traps produced no fish.

Table 3. Lake catch summary for sport fish in Dina Lake #2, 2002.

Date	Species	Gill Net Site			Trap Net	Angled	Gee Traps			Total	Number Sampled	Size Range (cm)
		1	2	3			1	2	3			
June 18	EB	4	2	-	1	1	-	-	-	8	8	29.2 – 35.1
June 20	EB	-	-	12	-	-	0	0	0	12	12	30.5 – 43.8
June 20	RB	-	-	2	-	-	0	0	0	2	2	26.1 – 50.0

Trap Net

The trap net was set in a way that it would ideally capture brook trout when migrating at nightfall from the deep water towards the shallows looking for food. The trap was set overnight and pulled the next morning. Many lake chub (225) and longnose suckers (108) were trapped but only 1 brook trout made its way into the trap box. Therefore, gill nets had to be used next to try and find the stocked brook trout.

Gill Nets

Three different gill net sets were completed over a three day time frame (Appendix 1). Gill net (GN) set # 1 (sinking) was set for a period of 6 hours and 7 minutes on June 18. GN # 1 was set in the same location as in the 1991 survey to compare the catches between years. It was checked midway through the soak time and produced 1 brook trout and 17 long nose suckers. This GN was reset and when completely pulled yielded 4 brook trout and 39 longnose suckers. GN # 2 (floating) was set for a period of 4 hours and 25 minutes on June 18 and produced 2 brook trout. GN # 3 (an overnight sinking net set on June 19) yielded 12 brook trout, 2 rainbow trout, and 90 long nose suckers. The nets were checked periodically throughout the day to avoid any high fish mortalities. All brook trout caught were in the first 3 (shallower) net panels; indicating that brook trout were not captured deeper than 6-7 m.

We used the power function ($W = aL^b$) to describe the current weight-length relationship in these fish. In general, a "b" value of less than 3.0 indicates a reduction in weight-gain per increment of length while a "b" value greater than 3.0 indicates an increase in weight-gain per increment of length. The results from this 2002 evaluation were compared to the previous results of the 1991 evaluation on Dina #2 (Figures 3 & 4). In 1991, the fish were a little more robust as compared to the 2002 population. The difference in "b" values between years is noticeable and may have to do with the uneven distribution of samples in the 2002 data (i.e. lack of samples in the 40 to 45 cm fork length range). These two larger fish may be influencing the model. Another difference

between years is that there was a wider range of sizes in 1991 as compared to the more similar sized fish captured in 2002.

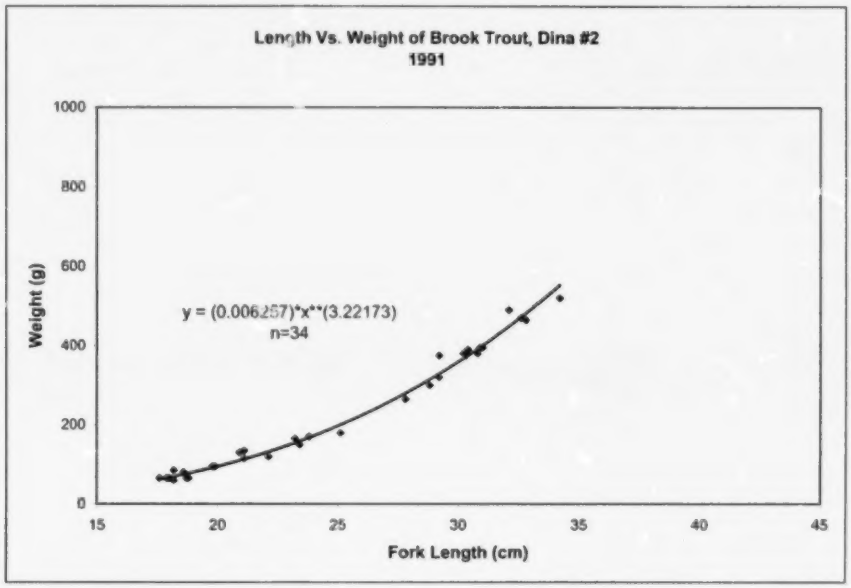

Figure 3. Length versus weight of brook trout in Dina Lake #2, in 1991.

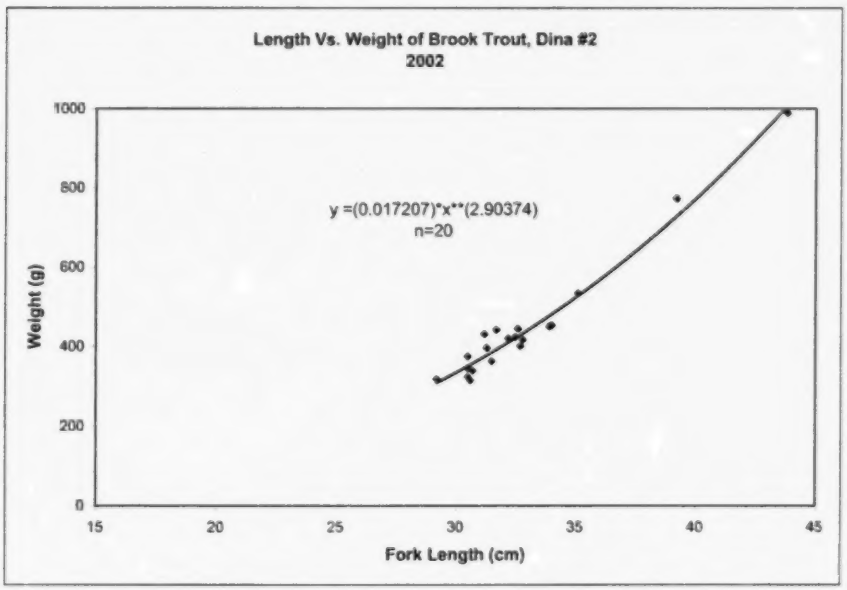

Figure 4. Length versus weight of brook trout in Dina Lake #2, in 2002.

Age determination for the 20 brook trout and 2 rainbow trout was reviewed by North/South Consultants (Appendix 2). The majority of brook trout (13 of 20) caught were age class 2. The oldest brook trout observed was age 4. The two rainbow trout caught were age class 4 and 7. Prints of the scales and age markings were provided for each fish and reviewed by PWFWCP fish biologists. No obvious errors were detected although four of the prints were difficult to read (no annuli indicated).

We used condition factors to reflect the nutritional state or "well-being" of an individual fish (Figure 5). The average condition factor of 1.23 for brook trout in 2002 indicates healthy fish. We did not test the trend in the data for statistical significance; however, we believe there still is an adequate food supply within the lake to support the well conditioned state of these fish. Condition factors were calculated and compared where possible to the 1991 data (Figure 6, Table 4). The average condition factor for the 1991 sample was slightly higher (1.27). The smaller sized fish captured in 1991 (i.e. 17 to 20 cm FL) may account for the differences in condition factor as there is generally a wider variance of condition around these smaller sized fish. The main purpose of this assessment was to evaluate the adult catchable sized fish (~ 27 to 35 cm). The average condition factor for this adult size range in 1991 (n = 18) is 1.34 while in 2002 (n = 16), it dropped slightly to 1.23. There appears to be a slight decrease in the size of fish as they get older (Figure 5B) but this decline is not influential enough to change the stocking schedule.

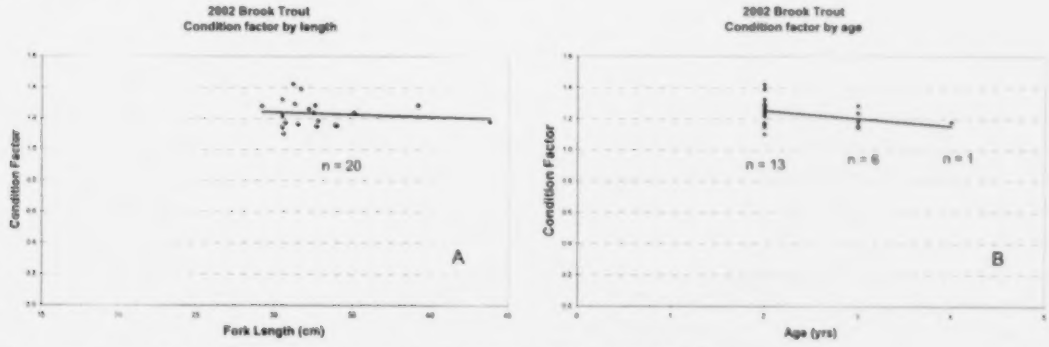

Figure 5. Condition factors of brook trout in Dina Lake #2, 2002.

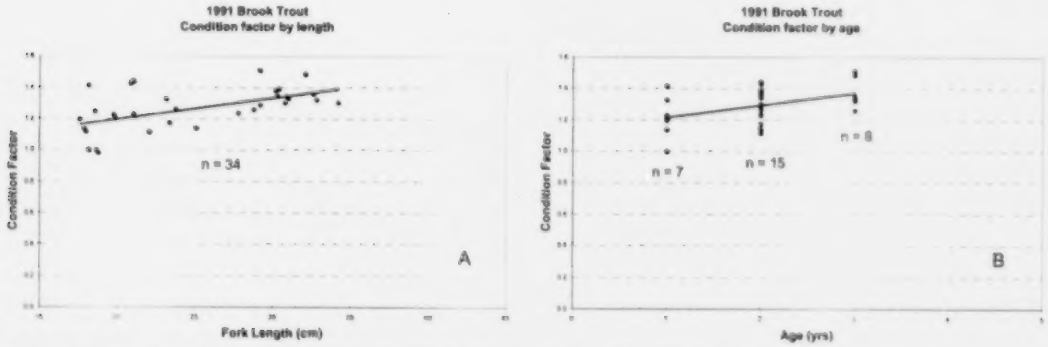

Figure 6. Condition factors of brook trout in Dina Lake #2, 1991.

Table 4. Condition factors for brook trout captured in Dina Lake #2 in 1991 and 2002.

Condition Factor	1991 Survey Results	2002 Survey Results
Number of fish	34*	20
Mean C.F.	1.27	1.23
Minimum C.F.	0.98	1.10
Maximum C.F.	1.51	1.42
Standard Deviation	0.13	0.09

* Four EB are not included in 1991 CF calculations as no weight data was collected.

Mean lengths and weights were also calculated for each fish sampled by age class (Table 5). While the range in lengths did not vary substantially for the smaller sized fish (age 2), there was a wide range in weights for the larger aged fish (age 3 and 4). Some of the ageing data was questionable and could account for this variance.

Table 5. Population characteristics of brook trout in Dina Lake #2, 2002.

Age Class	Sample No.	Mean Length (cm)	Range of Length (cm)	SD for Length	Mean Weight (g)	Range of Weight (g)	SD for Weight
1	0	n/a	n/a	n/a	n/a	n/a	n/a
2	13	31.3	29.2 – 32.7	1.03	385.6	315.0 – 444.0	46.24
3	6	34.3	30.5 – 39.2	2.88	491.7	324.0 – 772.0	153.16
4	1	43.8	43.8	n/a	989.0	989.0	n/a

The brook trout in Dina Lake #2 appear to exhibit good growth rates (Figures 7 and 8). The age 2 fish are attaining a mean length of 313 mm and a mean weight of 386 g. By age 4, they are averaging a mean length of 343 mm and weighing 492 g. In comparison, the 1991 sample shows smaller fish. At age 2, their average length was 267 mm and they weighed 266 g. By age 3, these fish grew to 312 mm and weighed 414 g. With the lake being stocked for many years, there appears to be no signs of stunting. No age one fish were captured in the 2002 survey to make any comparisons.

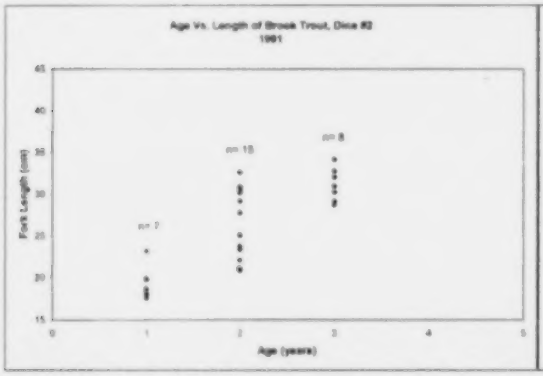

Figure 7. Age versus length of brook trout in Dina Lake #2, 1991.

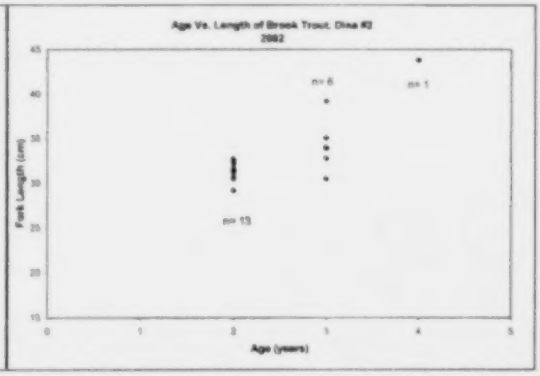

Figure 8. Age versus length of brook trout in Dina lake #2, 2002.

The catch composition of brook trout captured in 2002 appears to be of larger sized fish. The results from the 1991 survey captured many more smaller fish. It is unknown why there would be such a noticeable difference in the size distribution of fish (Figure 9). The net was placed in the same location as previous surveys to compare between years. Soak times were the same (6 hours in both survey years). The time of year for each survey was similar and the same sized experimental gill net was used. Very few fish (4 EB) were captured in this location, so it had to be moved to a different location in an attempt to capture more fish.

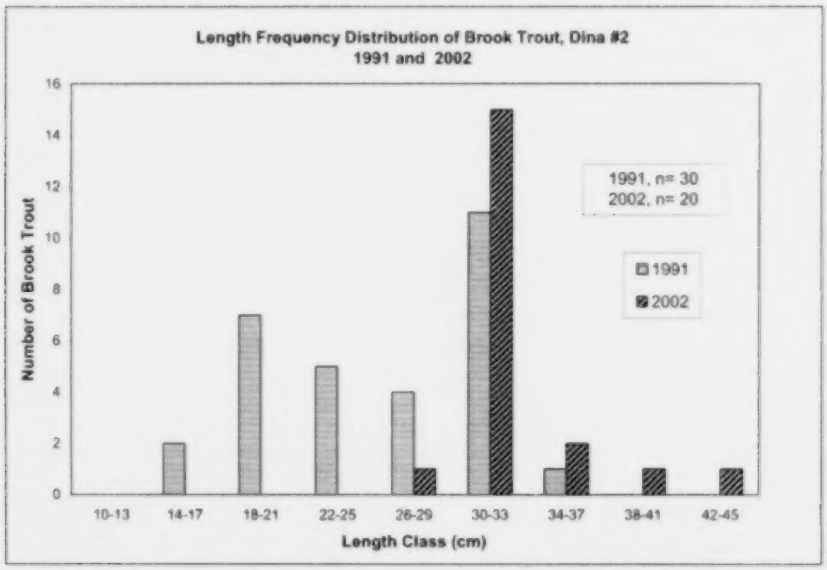

Figure 9. Length frequency distribution of brook trout in Dina Lake #2, 1991 and 2002.

Gee Traps

Three Gee traps were used in an attempt to capture juvenile fish. Gee traps # 1-2 were baited with catfood, while Gee trap #3 was baited with sardines. The traps were set over two nights (Figure 2, Table 6). No brook trout were captured. Only lake chub and longnose suckers were observed in the Gee traps.

Table 6. Gee trap results, Dina Lake #2, 2002.

Trap No.	Hours fished	Depth (m)	Substrate	Species	Number	Size Range (mm)
1	49 hr	1.05 cm	Organics + wood	LKC	165	49-97
	47 min			LSU	3	54-85
2	49 hr	0.88 cm	Organics, leaves,	LKC	133	54-95
	30 min		SWD[1]	LSU	22	49-100
3	49 hr	0.97 cm	Organics, wood ,	LKC	186	52-95
	16 min		LWD[2]	LSU	30	45-105

[1]SWD = small woody debris , [2]LWD = large woody debris

Angling

On June 18, Program biologists angled for 1.0 hour and 45 minutes using two rods and caught one brook trout. Catch per unit effort is 0.7 fish per rod hour. The brook trout was 324 mm and 407 g and released alive. One belly boater was encountered who just arrived at the lake and reported satisfaction in his fishing experience in the previous week prior to this survey.

Limnology

An oxygen/temperature profile station was established at the determined deepest part of the lake (Figure 2). The limnology profile was completed on June 18, 2002 at 1100 hours. Weather conditions were 5% overcast with no wind. Water temperature and dissolved oxygen measurements were taken at 1.0 m intervals (Table 7).

In addition to the 2002 results, Program biologists were working on a different project on Dina Lake #2 in September of 2000. At that time, an oxygen/temperature profile was also taken at the determined deepest part of the lake (similar to the 2002 location). Oxygen levels on September 20, 2002 were higher when compared to the 2002 data at the deeper depths (Table 7).

Table 7. Limnology Profile for Dina Lake #2, June 18, 2002 and September 20, 2000.

Depth (m)	2002 Oxygen (O_2)	2002 Temperature (° Celsius)	2000 Oxygen (O_2)	2000 Temperature (° Celsius)
Surface	9.9	17.2	10.2	11.5
1 m	10.2	17.0	10.0	11.5
2 m	9.7	16.5	9.9	11.4
3 m	10.0	16.2	9.9	11.3
4 m	11.7	13.6	9.5	11.3
5 m	13.0	10.7	8.9	11.1
6 m	12.6	9.2	8.8	10.9
7 m	10.7	8.4	8.2	10.7
8 m	7.8	7.6	7.5	10.6
9 m	2.7	6.9	6.4	10.5
10 m	0.9	6.36	4.9	10.3
11 m	0.6	6.5	2.8	10.0
12 m	bottom	bottom	0.8	9.7
13 m			bottom	bottom

BIOLOGICAL ANALYSIS OF BROOK TROUT

A biological analysis was conducted on 20 brook and 2 rainbow trout (Appendix 2). Reproductive organ analysis of the 20 brook trout determined that 4 were immature females and 4 were maturing females, 4 immature males and 1 maturing male, and 7 immature of

undetermined sex. Examination of stomach contents suggest that brook trout are preying primarily on zooplankton and dragonflies. Other common foods include: fish (lake chub), snails, beetles, and chironomids. As these fish are sterile, there was no evidence of spawnbound. Seven fish were noted as having tapeworms in their stomach cavities and a few had gill lice.

Reproductive organ analysis of the two rainbow trout determined that one was a gravid female and one a gravid male. Examination of stomach contents revealed that rainbow trout are preying primarily on small insects including dragonflies, terrestrial insects, and snails. The female fish was full of eggs and the male had a dark red appearance indicating that they were ready to spawn in the spring of 2002 (if the habitat was available to them). One of these rainbows had gill lice.

DRAINAGE

Dina Lake #2 contains no permanent inlets. During the 1991 evaluation, the lake was reported to have an intermittent inlet located on the north east shore. This potential inlet was examined during the 2002 survey and was found to contain no flow and has no fisheries values.

Dina #2 does contain an outlet stream. This stream is named Dina Creek and flows approximately 1 km into Dina Lake #1. This outlet is controlled by a 30 m long beaver dam approximately 1.0 m in height. Downstream of the first beaver dam is a series of additional dams. One particular dam is approximately 1.5 m high and is a barrier to upstream fish passage. Approximately 600 m of this stream was channelled out and spawning gravel was added to improve fish spawning success. This stream offers excellent spawning potential for trout. This creek is maintained each spring by Program biologists to enhance the stream for spawning fish.

BENCHMARK

The benchmark on the south shore was re-located (Figure 2). The benchmark was originally set during the 1970 survey but the initial benchmark height is unknown. The 1991 survey found the benchmark at an initial height above water of 1.66 m in a 30 cm D.B.H. spruce tree, 0.0 m from shore (water's edge). The 2002 survey found the benchmark 0.0 m from shore (water's edge) in a 30 cm D.B.H. spruce tree. The spike is currently at 1.19 m above the current lake level, indicating a rise in the lake level of 0.47 m since 1991. The benchmark was re-painted.

FISHERIES MANAGEMENT COMMENTS

Dina Lake #2 supports a healthy population of stocked brook trout; however the number of fish captured in the overnight net set and trap net appears low for the large number of fish stocked each year. Angling pressure on this lake is presumed average and may have removed a sizeable portion of these stocked fish over time. While no creel (ground) surveys have been recently

conducted on Dina #2, the PWFWCP did conduct an aerial boat count on this particular lake during the summer of 2002. There were 19 different schedules flights (randomly picked Saturdays and Sundays) throughout the summer and a total of 3 anglers were observed on Dina #2. This would suggest that the summer angling pressure on Dina #2 is quite low. The amount of winter use (ice fishing) on this lake is currently unknown.

Another possible reason for the lack of brook trout capture success may have to due to the oxygen levels within the lake. Since the lake has two small basins (< 3.0 m deep), it is possible that fish overwintering in these shallow basins are isolated from the deeper main basin (13 m) and could run out of oxygen by spring time. The ice was off the lake this past summer by May 19. In some years, Dina Lake #2 is suspected of having a winter kill problem. Oxygen levels for brook trout are adequate in the summer but only in the top 2/3 of the lake (Table 7). The recommended oxygen concentration for brook trout is > 7 mg/L (Ford et. al. 1995). A winter profile has not been conducted on Dina Lake #2 and may provide some possible answers as to why the gill net catch per unit effort is low for the large amount of fish stocked in this lake.

Condition factors for these brook trout were quite similar over the 11 year time span (2 sample years). There appears to be no signs of stunting so there should not be any intraspecific competition for food. The brook trout are obtaining a large enough size where they can take advantage of the lake chub population that is abundant within Dina #2.

Brook Trout

Currently, Dina Lake # 2 is being stocked on an annual basis with 10,000 sterile fish. The net catch per unit effort was lower in 2002 than compared to the 1991 results (both years received approximately 24 hours of netting). In 1991, both gill nets yielded 36 brook trout (C.P.U.E. = 1.5). All fish were captured in the first few panels of the net and no fish were captured in water deeper than 3.0 m. In June 2002, gill net #1 and #3 (sinking nets) produced 16 brook trout (C.P.U.E. = 0.66). The majority of fish captured here were in the first 3 panels of net and no deeper than 6 to 7 m deep. All of these gill net results suggest that the brook trout appear to be located in the upper part of the water column and may not be using the more depleted oxygen layers near the bottom.

Rainbow Trout

The two rainbow trout that were caught originated from the stocking of Dina Lake #1 with rainbow trout. Rainbow trout from Dina #1 do utilise Dina Creek each spring for spawning. It is suspected that some of these fish made their way all the way up and over the beaver dam on the outlet of Dina #2. It is unknown how many rainbow trout have moved their way into Dina #2 over the years. The average condition factor for these two rainbow was 1.06 which indicates relatively healthy fish.

Non-game fish

Dina Lake #2 also supports a population of longnose suckers and lake chub. Although not studied intensively, both the longnose suckers and lake chub populations were abundant. Black spot disease was noted on both species.

MISCELLANEOUS COMMENTS

1. Photographs of Dina Lake #2 were taken of some fish species and the surrounding habitat. Most photos were taken to document the change in features over time (i.e. habitat) and are not significant to the relevance of this report on fish stocking. Therefore, these photos are not displayed in this fish stock assessment report but can be viewed at the PWFWCP office (address indicated at the beginning of this report).
2. Only under special situations can brook trout be stocked within the Omineca/Peace Region. These situations are restricted to closed lake systems only (no outlets). While Dina Lake #2 does have an outlet and this outlet flows into a closed lake system (Dina Lake #1), brook trout are still permitted to be stocked within this system. Dina Lake #1 was originally stocked with brook trout but ceased in 1998. As a result, any future stocking assessments on Dina Lake #2 should include examining the benchmark on Dina Lake #1 for the current water level. Examining this benchmark over time will ensure that the water level in Dina #1 does not exceed its banks and eventually form some sort of an outlet (i.e. by Dina Lake #10). In 1998, the water level in Dina #1 was at 1.45 m and the water level would have had to rise 83 cm before flowing towards Dina Lake #10.

FISH STOCKING PROGRAM

The current number of fish stocked in Dina Lake #2 appears to be high for the small size of the lake. The 2002 gill net C.P.U.E. numbers were low. The potential of winter kill and total angling pressure is unknown at the present time and requires future investigation to address these unanswered questions.

Before an accurate judgment can be made on the future stocking of this lake, it is recommended that winter oxygen readings be conducted in all three basins within Dina #2. As no winter oxygen profile has been completed on this lake, it is suspected that a winter kill problem may be occurring (at least in some years) and that is one possible limiting factor for fish productivity. Adjusting (adding or reducing) the annual stocking rate may be futile if this lake expresses low oxygen levels towards the end of winter.

If these readings are conducted in the future and the oxygen levels are low based on the recommended requirements suggested by Ford et. al. 1995, then the future stocking of brook trout should cease. There are a number of lakes in the same vicinity as Dina #2 which do not

have low concentrations of oxygen. These lakes should be able to accommodate the additional anglers.

Should winter oxygen levels appear adequate for brook trout, then the numbers of fish stocked into the lake may have to be re-considered. Dina #2 receives a lot of fish for its small size and the high cost for this stocking would have to be further justified by its use. A fair amount of effort went into obtaining samples from the lake and was met with minimal to moderate success. A future creel survey would assist in the amount of use this lake receives in a given year. The 2002 aerial boat count data does suggest that Dina #2 receives a small amount of use during the summer (when compared to other lakes in the area).

If an accurate estimate on use can not be determined, then possibly reducing the annual stocking by half (5,000 fish) would make a better match for this small sized lake. This reduction in numbers would free up more oxygen in the lake and would allow the lesser number of fish stocked with a better chance of survival throughout the winter months (less competition). The next scheduled stock assessment should then happen after 4 years (summer of 2007) if it remains to be stocked in the future.

LITERATURE CITED

Ford, B.S., P.S. Higgins, A.F. Lewis, K.L. Cooper, T.A. Watson, C.M. Gee, G.L. Ennis, and R.L. Sweeting. 1995. Literature reviews of the life history, habitat requirements and mitigation/compensation strategies for thirteen sport fish species in the Peace, Liard and Columbia River drainages of British Columbia. Can. Manuscr. Rep. Fish. Aquat. Sci. 2321: xxiv+342 p.

McLean, A.R. and A.R. Langston 1991. Fish Habitat Enhancement Potential and Stocking Assessment of Dina Lake (#2). Peace/Williston Fish and Wildlife Compensation Program. Report No. 118. 13pp plus appendices.

Jesson, Duane A.1992. Fisheries management plan for the Dina Lakes. B.C. Environment, Fisheries Branch, Prince George, B.C. 18pp plus appendices.

APPENDIX 1

Netting Record

Lake: Dina #2

TRAP NETTING RECORD **June 17, 2002**

Trap net: (3.175 mm stretch mesh)

TRAP NETTING SITE #1			
Type:	Trap net		
Date Set:	June 17, 2002	Time:	1713 hrs
Date Lifted:	June 18, 2002	Time:	1030 hrs
Trap box depth:	3.2 m		
Mouth Depth:	3.6 m		
100' lead line depth:	6.5 m		

Comments:

Trap net was set June 17 overnight. Trap net # 1 produced a total of 1 brook trout, 108 long nose suckers, and 225 lake chub.

GILL NETTING RECORD **June 18, 2002**

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

GILL NETTING SITE #1			
Type:	Sinking monofilament gill net		
Date Set:	June 18 , 2002	Time:	0953 hrs
Date Lifted:	June 18 , 2002	Time:	1600 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	1.3 m organics + LWD[1]
Deep End Mesh Size:	64 mm	Depth: Substrate:	10.0 m ?

[1] LWD = large woody debris

Comments:

Gill net was set June 18 in the same location as the 1991 survey. Net was checked at 1220 hrs on June 18 and yielded 1 brook trout and 17 long nose suckers. Net was reset and pulled a few hours later. Gill net # 1 produced a total of 4 brook trout and 39 long nose suckers.

GILL NETTING RECORD **June 18, 2002**

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

GILL NETTING SITE #2			
Type:	Floating monofilament gill net		
Date Set:	June 18 , 2002	Time:	1155 hrs
Date Lifted:	June 18, 2002	Time:	1620 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	1 6 m cobble/gravel/ SWD[1]
Deep End Mesh Size:	64 mm	Depth: Substrate:	11.0 m ?

[1] SWD = small woody debris

Comments:

Gill net #2 was set June 18. Net was pulled at 1620 hrs on June 18 and not reset. Gill net # 2 produced a total of 2 brook trout.

GILL NETTING RECORD **June 19, 2002**

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

GILL NETTING SITE #3			
Type:	Sinking monofilament gill net		
Date Set:	June 19 , 2002	Time:	1740 hrs
Date Lifted:	June 20, 2002	Time:	1000 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	0.5 m cobble/gravel/ SWD[1]
Deep End Mesh Size:	64 mm	Depth: Substrate:	8.9 m ?

[1] SWD = small woody debris

Comments:

Gill net #3 was set June 19. Net was pulled June 20 at 1000 hours. Gill net # 3 produced a total of 12 brook trout, 2 rainbow trout, and 90 long nose suckers.

APPENDIX 2

Individual Fish Data

Lake: Dina #2

DINA # 2 LAKE
INDIVIDUAL FISH DATA

Date Captured: **June 18, 2002**
Trap Net Set # 1: 17h 17 min hour soak
Angling: 2 rods @ 1h 45 min
GN # 1 sinking: 6h 7 min hour soak
GN # 2 floating: 4h 25 min hour soak

M - Male
F - Female
? -Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish
Tag Fish
ST - Stomach

SC- scale
FR- Fin Ray
OT- Otolith
WF - Whole

Method of Capture: sinking trap net / angling / gill nets (sinking and floating) **AS NOTED IN COMMETS**
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	Condition Factor	Gonadal Maturity	Sex	Sample Type	Age (yrs)	Stomach Contents				Comments
								Plankton	Insects	Fish	Other	
EB	32.5	424	1.24	IMM	M	SC	2			LSU + LKC		Trap net # 1; 3 fish in mouth, 8 fish in total (LSU + LKC)
EB	31.2	431	1.42	IMM	M	SC	2		beetle head	X2		GN # 1
EB	30.5	345	1.22	IMM	F	SC	2	lots zooplankton	lots chironomid	0		Angled; small eggs
EB	30.6	315	1.10	IMM	M	SC	2		dragonfly			GN # 1; tapeworms, hard to tell sex
EB	35.1	534	1.23	IMM	M	SC	3	zooplankton	terrestrial bug + snail + dragonfly			GN # 1
EB	34.0	453	1.15	IMM	?	SC	3	zooplankton	dragonfly			GN # 1; not much food
EB	33.9	450	1.16	IMM	F	SC	3	zooplankton	dragonfly + chironomid		detritus	GN # 2 (floating); definitely female; tapeworms
EB	29.2	318	1.28	IMM	F	SC	2			fish		GN # 2 (floating); definitely female; tapeworms

Ch.	chaoborus	P.M.	phantom midge	T.W	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Dina #2

DINA # 2 LAKE
INDIVIDUAL FISH DATA

Date Captured: **June 19-20, 2002**
Gill Net Set # 3: 16h 20 min hour soak

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: sinking monofilament gillnet
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	Condition Factor	Gonadal Maturity	Sex	Sample Type	Age (yrs)	Stomach Contents				Comments
								Plankton	Insects	Fish	Other	
RB	26.1	185	1.04	GV	F	SC	4		terrestrial + larva			Full of eggs; tapeworm; gill lice
RB	50.0	1350	1.08	GV	M	SC	7		snail, dragonfly		stone	Very red; no gill lice
EB	30.5	375	1.32	MG	F	SC	2	zoo.		1 fish		
EB	30.5	324	1.14	IMM	?	SC	3				aquatic veg.	Empty
EB	31.3	396	1.29	IMM	?	SC	2					Tapeworms
EB	39.2	772	1.28	MG	F	SC	3			LKC x 5		robust
EB	32.6	444	1.28	MG	M	SC	2					empty
EB	32.8	417	1.18	IMM	?	SC	3		terrestrial	1 fish	detritus, snail, worm	tapeworms
EB	31.5	363	1.16	IMM	?	SC	2					Empty
EB	32.2	420	1.26	MG	F	SC	2				aquatic veg	Tapeworms; empty
EB	30.7	339	1.17	IMM	?	SC	2	lots zoo.				
EB	32.7	401	1.15	IMM	?	SC	2					empty
EB	31.7	442	1.39	MG	F	SC	2	lots zoo.			snails	
EB	43.8	989	1.18	IMM	F	SC	4				1 fish	tapeworms

Ch. chaoborus
Cl. clams
G. gammarus
Le. leeches
P.M. phantom midge
O.M. organic matter
L. lice
T.W. tapeworms
S. snails
M. mayflies (general)
Da. daphnia
Di. diptera
Ca. callibaetis

AGE DETERMINATION

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